

What is claimed is:

1. A linear guide mechanism for guiding rings supporting components of a lens barrel along an optical axis; the mechanism comprising:

5           an outer ring supporting a first imaging component;  
an inner ring positioned radially inwardly of said  
outer ring for supporting a second imaging component;  
a first guide ring configured to linearly guide the  
outer ring without rotation of the outer ring;  
10          a second guide ring configured to linearly guide the  
inner ring without rotation of the inner ring; and  
a linear guide ring having at least one guide portion  
located on an inner peripheral surface of the linear guide  
ring, said at least one guide portion engageable with said  
15         first and second guide rings, said outer ring and said  
inner ring being independently guidable via the  
respective first and second guide rings and are movable  
linearly along said optical axis without rotating.

2. The linear guide mechanism according to claim  
20 1, wherein said at least one guide portion comprises a  
pair of guide portions each respectively engageable with  
the first guide ring and the second guide ring.

25         3. The linear guide mechanism according to claim  
1, wherein said linear guide ring is positioned radially  
outwardly of said outer ring.

4. The linear guide mechanism according to claim  
2, wherein said guide portion engageable with the first  
guide ring comprises at least one first guide ring linear  
guide groove extending generally parallel to said optical  
axis; and

wherein said first guide ring has at least one guide  
projection located on an outer peripheral surface thereof  
and engageable in said first guide ring linear guide  
groove.

10 5. The linear guide mechanism according to claim  
4, wherein the first guide ring comprises at least one  
outer ring linear guide groove located on an inner  
peripheral surface thereof and extending generally  
parallel to said optical axis; and

15 wherein said outer ring comprises at least one guide  
projection located on an outer peripheral surface thereof  
and engaged in said outer ring linear guide groove.

6. The linear guide mechanism according to claim  
4, wherein a plurality of first guide ring linear guide  
20 grooves are provided around the circumference of the  
linear guide ring.

7. The linear guide mechanism according to claim  
2, wherein said guide portion engageable with the second  
guide ring comprises at least one second guide ring linear  
25 guide groove extending generally parallel to said optical

axis; and

wherein said second guide ring has at least one guide projection projecting radially outwardly therefrom and engageable in said second guide ring linear guide groove.

5        8. A linear guide mechanism according to claim 7, wherein said second guide ring comprises at least one linear guide key extending generally parallel to said optical axis; and

10      wherein said inner ring comprises at least one inner ring linear guide groove engageable with said linear guide key.

15      9. The linear guide mechanism according to claim 7, wherein said at least one second guide ring linear guide groove comprises a plurality of second guide ring linear guide grooves, provided around the circumference of the linear guide ring.

20      10. The linear guide mechanism according to claim 7, wherein said second guide ring linear guide groove comprises generally parallel aligned pairs of grooves; and

wherein said guide portion engageable with the first guide ring is circumferentially located between the aligned pairs of grooves.

25      11. The linear guide mechanism according to claim 10, wherein said guide portion engageable with the first

guide ring comprises at least one first guide ring linear guide groove extending generally parallel to said optical axis.

12. The linear guide mechanism according to claim 5 1, further comprising a cam ring having at least one outer cam groove located on an outer peripheral surface thereof, and at least one inner cam groove located on an inner peripheral surface thereof;

wherein the outer ring includes at least one cam follower projecting radially inwardly and engageable in said outer cam groove of said cam ring; and

wherein the inner ring includes at least one cam follower projecting radially outwardly and engageable in said inner cam groove of said cam ring.

15 13. The linear guide mechanism according to claim 12, wherein said second guide ring comprises a ring portion supported by a rear end portion of said cam ring, the cam ring being rotatable relative to said ring portion and immovable relative to said ring portion in said 20 optical axis direction.

14. The linear guide mechanism according to claim 1, further comprising a stationary barrel which supports said linear guide ring and guides said linear guide ring linearly in said optical axis direction without rotating 25 said linear guide ring.

15. The linear guide mechanism according to claim 1, wherein said first guide ring is positioned radially outwardly of said outer ring.

16. The linear guide mechanism according to claim 5 1, wherein said lens barrel is incorporated in a camera.

17. A linear guide mechanism of a lens barrel, comprising:

a cam ring having at least one outer cam groove and at least one inner cam groove which are formed on an outer 10 peripheral surface and an inner peripheral surface of said cam ring, respectively;

an outer movable ring positioned radially outside said cam ring, supporting a first imaging component, and including an inward cam follower which projects radially 15 inwards to be engaged in said outer cam groove of said cam ring;

an inner movable ring positioned radially inside said cam ring, supporting a second imaging component, and including an outward cam follower which projects radially 20 outwards to be engaged in said inner cam groove of said cam ring;

a non-rotatable linear guide ring positioned radially outside said cam ring, said linear guide ring including at least one linear guide portion located on 25 an inner peripheral surface of said linear guide ring to

extend parallel to an optical axis of said lens barrel; a first linearly-guided ring directly guided linearly by said linear guide portion of said linear guide ring without rotating; and

5 a second linearly-guided ring directly guided linearly by said linear guide portion of said linear guide ring without rotating,

wherein said outer movable ring and said inner movable ring are independently linearly guidable along 10 said optical axis without rotating, by one and the other of said first linearly-guided ring and said second linearly-guided ring, respectively.

18. The linear guide mechanism according to claim 17, wherein said linear guide ring is positioned radially 15 outside said outer movable ring.

19. The linear guide mechanism according to claim 17, wherein said linear guide portion of said linear guide ring comprises at least one first linear guide groove extending generally parallel to said optical axis, 20 wherein said first linearly-guided ring comprises:

a first linear guide projection located on an outer peripheral surface of said first linearly-guided ring and engageable in said first linear guide groove; and a second linear guide groove located on an inner 25 peripheral surface of said first linearly-guided ring and

extending generally parallel to said optical axis,  
wherein said outer movable ring comprises a second  
linear guide projection located on an outer peripheral  
surface of said outer movable ring and engageable in said  
5 second linear guide groove;

wherein said linear guide portion of said linear  
guide ring comprises a third linear guide groove extending  
parallel to said optical axis;

wherein said inner movable ring comprises a fourth  
10 linear guide groove extending generally parallel to said  
optical axis; and

wherein said second linearly-guided ring  
comprises:

a ring portion supported by a rear end portion of  
15 said cam ring and immovable relative to said cam ring in  
said optical axis direction and allows said cam ring to  
rotate relative to said ring portion;

a third linear guide projection which projects  
radially outwards from said ring portion and is engageable  
20 in said third linear guide groove; and

a linear guide key which projects from a radially  
inner edge of said ring portion and extends in said optical  
axis direction and is engageable in said fourth linear  
guide groove.

25           20. The linear guide mechanism according to claim

19, wherein said first linear guide groove comprises a plurality of first linear guide grooves located at different circumferential positions, and

5       wherein said third linear guide groove comprises a plurality of third linear guide grooves located at different circumferential positions.

21.     The linear guide mechanism according to claim 17, further comprising a stationary barrel which supports said linear guide ring and is configured to guide said 10 linear guide ring linearly in said optical axis direction without rotating said linear guide ring.

22.     The linear guide mechanism according to claim 17, wherein said first imaging component comprises a first movable lens group,

15       wherein said second imaging component comprises a second movable lens group, and

      wherein said first movable lens group and said second movable lens group are movable in said optical axis direction in a predetermined moving manner in accordance 20 with a rotation of said cam ring.

23.     The linear guide mechanism according to claim 17, wherein said lens barrel is an imaging lens, said second imaging component comprising at least one of a lens group, an adjustable diaphragm and a shutter.